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NIF Project Quality Assurance Program Plan Revision E

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DISCLAIMER

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NIF Project
Quality Assurance Program Plan

Revision E

June 2001

LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California • Livermore, California • 94550

NIF Project Quality Assurance Program Plan

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Contents

NIF Quality Assurance Policy

NIF Project activities will be conducted in a manner consistent with the guidance and direction of the DOE Orders on Quality Assurance (QA) and the LLNL QA Program. QA criteria will be applied in a graded manner to achieve a balance between the rigor of application of QA measures and the scale, cost, and complexity of the work involved. The QA measures will be graded consistently with a low-hazard, radiological facility.

Accountability for quality is everyone's responsibility, extending from the Project Manager through established lines of authority to all Project personnel, who are responsible for the requisite quality of their own work.

The NIF QA Program will be implemented by trained personnel conducting their activities to meet requirements and expectations, according to established plans and procedures that reflect the way business is to be conducted on the Project.

Edward I. Moses
NIF Project Manager

INTRODUCTION

The National Ignition Facility (NIF) is a key constituent of the Department of Energy's (DOE's) Stockpile Stewardship Program. The NIF will use inertial confinement fusion (ICF) to produce ignition and energy gain in ICF targets and will perform weapons physics, weapons effects, and high-energy-density experiments in support of national security and civilian objectives.

The primary mission of the NIF Project is the design and construction of the facility and equipment, acceptance testing, and activation. To accomplish this mission, the LLNL Director created the NIF Programs Directorate, and within that Directorate, the NIF Project Office to organize and manage the Project. The NIF Project Office establishes this QA Program to ensure its success. This QA Program Plan (QAPP) defines and describes the program—the management system—for specifying, achieving, and assuring the quality of all NIF Project work consistent with the policies of LLNL and the NIF Programs Directorate.

Purpose and Scope of the NIF QA Program Plan

This QAPP describes the program implemented to comply with the requirements of *DOE Order 5700.6C, Quality Assurance* *and guidance contained in the *LLNL Quality Assurance Plan,* UCRL-MA-133867. The QAPP also complies with the principles and functions of DOE P 450.4, *Safety Management System Policy*. This QAPP integrates the requirements of DOE O 5700.6C, *Quality Assurance,* DOE O 414.1A, *Quality Assurance* and 10 CFR 830 Subpart A, *Quality Assurance.*

Implementation of this QAPP is defined by the policies and procedures invoked by the NIF Project (Appendix B, Compliance Summary).

The quality program implemented by this QAPP is expressed in the following hierarchy of documents:

- DOE P 450.4, *Safety Management System Policy*.
- DOE Order 5700.6C, *Quality Assurance*—establishes QA requirements for work performed by DOE and its contractors.
- DOE Order 414.1A, *Quality Assurance*—establishes QA requirements for work performed by DOE and its contractors.
- 10 CFR 830 Subpart A, *Quality Assurance*—establishes QA requirements for work that affects, or may affect, the safety of DOE nuclear facilities.
- *LLNL Quality Assurance Program* (UCRL-MA-133867, Volume IV Part 3 of the ES&H Manual)—establishes QA requirements applicable to LLNL projects and facility operations.
- *NIF Directorate Quality Assurance Plan* (NIF-0054117)—provides the organizational responsibilities and QA policies for the NIF Directorate.
- *NIF Project QA Program Plan* (NIF-0000618-OE)—(this document) contains core policies and lists procedures for implementing QA for the NIF Project.
- Ancillary (subtier) or subcontractor QA plans—contain policies and procedures that apply to organizations within the Project or to subcontractors (vendors). These plans address the management of activities specific to each organization's responsibility. Example plans are:
  —*NIF Software QA Plan for the NIF Integrated Computer Control System* (NIF-0000288)
  —*Jacobs Facilities, Inc., Project Plans/Project Quality Plan* (section 2.0)
- Implementing policies, procedures, and instructions—provide direction for tasks within the framework of this management program.

Core Program policies are subsections of this QAPP. Where necessary, additional policies and procedures will supplement this QAPP (reference Appendix B). The approved documents in force to control work are on the NIF Project internal website at URL: http://www-r.llnl.gov/nif/nifproj/qa/

* DOE Order 5700.6C Quality Assurance is the NIF Work Smart Standard requirement incorporated in Appendix G of the contract between the DOE and the University of California.

Additional References

- DOE G 414.1-1, Implementation guide for use with independent management assessment requirements of 10 CFR 830.120 and DOE O 5700.6C, Quality Assurance.
- DOE G 414.1-2, Quality Assurance Management System Guide for use with 10 CFR 830.120 and DOE O 5700.6C, Quality Assurance.
- DOE G 440.1-6, Implementation guide for use with suspect/counterfeit items requirements of DOE O 440.1, Worker Protection Management.

Arrangement of This Document

This Plan is arranged according to the 10 QA criteria established for the total quality management system described in DOE Order 5700.6C:

- Management
  1 – Program
  2 – Personnel Training and Qualification
  3 – Quality Improvement
  4 – Documents and Records
- Performance
  5 – Work Processes
  6 – Design
  7 – Procurement
  8 – Inspection and Acceptance Testing
- Assessment
  9 – Management Assessment
  10 – Independent Assessment

Section 1.0 provides a description of the NIF Project management structure—the graded approach, the organization, and the responsibilities of senior managers in the Project who implement the Quality functions.

In Sections 2.0 through 10.0, the remaining nine QA criteria are summarized, followed by the Project's compliance policy for each.

Appendix A contains the Project organization chart.

Appendix B contains a listing of implementing policies and procedures.

Revision History

Document #	Date	Description/reason for change
NIF-LLNL-93-044	1/94	Initial release
NIF-LLNL-95-499	9/95	Revision for Title I
NIF-0000618	9/96	Major revision for Title II, implementing document summarized in appendix
NIF-0000618-OB	6/98	Revised for Title II and III
NIF-0000618-OC	6/99	Revised and submitted to DOE due to significant management changes
NIF-0000618-OD	7/00	Revised to reflect management changes, added phases, and the addition of Integrated Safety Management (ISM) requirements
NIF-0000618-OE	6/01	Incorporates requirements of 10 CFR 830 subpart A

MANAGEMENT

1.0 Program

1.1 QA Program Structure—the Graded Approach

This QAPP establishes specific responsibilities for implementing the Project's quality program in a graded manner, according to three QA levels (Q-Levels) in the following table

Q-Level	Quality Assurance activities
1	Full documentation, verification (e.g., inspection or review), and audits of augmented work activities involved.
2	Documentation, verification (e.g., inspection or review), and audits of some augmented work activities involved (sampling).
3	Documentation and verification that meet consensus standards specified for the work.

Q-Level 1—Hardware, software and/or activities whose failure could cause undue adverse consequences to the health and safety of employees or the public;* have significant potential for damage to the environment; or cause an unacceptable program interruption, monetary loss, or schedule delay. The consequences of failure are potentially unacceptable, and the probability of failure, without mitigation, is significant or unknown.

Q-Level 2—Hardware, software and/or activities whose failure could cause adverse consequences to the health and safety of employees;* have minor impact on the environment; or degrade the performance or reliability of operations, data acquisition, or deliverables. The consequences of failure are potentially significant but tolerable, and the probability of failure, without mitigation, is moderate or unknown.

Q-Level 3—Hardware, software and/or activities whose failure would not cause any significant health, environment, or safety consequence or loss or impairment of data generation. The consequences of failure do not affect the intended use of the product, and the probability of failure is low or unknown.

* Systems related to safety will be delineated from the hazards' evaluation of the *Preliminary Safety Analysis Report* and the draft *Final Safety Analysis Report*. These systems will receive the highest level of QA attention to ensure that the impacts to the environment, safety, and health risks are minimized.

Q-levels are "confidence levels" that consider the consequence and probability of failure, rather than "graduated levels of quality." These designations are applied, as appropriate, to all hardware, software and/or the activities associated with them. The extent of controls applied for each Q-Level is based on fundamental considerations, such as the consequences of failure, probability of failure, complexity of design and fabrication, degree to which function can be demonstrated by test or inspection, past performance, impact on schedule, and economic considerations. Augmented work controls (procedures, specifications, or work instructions) shall be prepared for Q-level 1 and 2 items.

The Associate Project Managers (the Project's technical authorities), working with the Systems Engineering Manager (the Project's risk assessment and management authority) are responsible for:

- Performing and documenting evaluations (e.g., risk assessment) to determine or revise the Q-Levels appropriate for the hardware and/or activities within their purview.
- Identifying the necessary augmented work controls for Q-level 1 and 2 items.
- Documenting the necessary controls for ensuring the quality of all work.

Radiological and Related Systems

The Q-Level Report, NIF #0005015, that is based on a graded approach identifies systems related to safety. Those systems having potential impact to radiological safety shall be identified in the Final Safety Analysis Report (FSAR). Information on the radiological aspects of safety and the system elements of interest shall be provided in the FSAR. The FSAR provides the information, hazards evaluation, accident analyses, and operational safety requirements necessary to assure the facility can be operated without endangering the safety of operations personnel or adversely affecting the public or the environment.

The line organization responsible for the development and production of the safety element identified as having potential radiological safety impact shall assure the established quality requirements have been satisfied and that this assessment is documented.

The Quality Assurance organization shall maintain a summary report confirming that the quality requirements of the identified items are satisfied. Radiological safety elements that potentially have impact during the operational phase will be included.

1.2 Organization

The NIF Project (Organization chart in Appendix A) is a matrix organization. Product organizations report to the Project Manager through the Associate Project Managers, line managers who are responsible for providing the materials and products

required for the NIF. Integrated Product Teams (IPTs) reporting through the Area Integration Team managers and the Systems Engineering Manager are responsible for integrating all activities required to produce specified products/systems. Support organizations (also known as Step organizations) include Engineering, Production, and Project Office organizations (Assurances, Project Controls, and Mission Support) that report directly to the Project Manager.

The Project Office provides funds to the product organizations to develop and produce products and services that are integrated into NIF. These requirements are defined, planned, and funded through the Control Account Plan (CAP). The IPTs review and authorize the work associated with the funds allocated to the product organizations. The IPT structure is composed of three elements—Integrated Product Teams (IPTs), Area Integration Teams (AITs) and Expert Groups. The IPTs directly interface with (product) line organizations and are responsible for specific systems associated with the NIF work breakdown structure (NWBS). The AITs are responsible for the integration of IPT activities that are specific to major segments of the NIF Project. Expert Groups evaluate specific technical issues, risks, or problems that have significant impact to the Project's success and provide technical advice toward its resolution. These three IPT elements work with the line organizations to assure integration of activities and to coordinate the resolution of significant issues and problems.

The Project Manager, supported by Deputy Project Managers, has the overall contractor authority and responsibility for the execution of the NIF Project in accordance with the Project Execution Plan (CD079). The Project Manager reports to the Associate Director of NIF Programs.

The QA program responsibilities of senior managers are summarized below. Authority to perform may be delegated to another qualified position in the same organization, but responsibility for action remains with the position named.

1.2.1 NIF Managers

NIF Managers include all managers that report and have responsibilities to the NIF Project. They are identified in the NIF Project organization chart and/or have line responsibility associated with a work group, work area, or Project task

The NIF Managers:

- Ensure that environmental, safety, radiation protection, quality assurance, and security programs are established and maintained to meet all applicable, federal, state, and local regulatory requirements; establish and provide resources to implement the Construction Safety Program. Conduct work under the principles and requirements of ISM.

- Develop, implement, and maintain an adequate Quality Program that will at minimal expense ensure that hardware and software deliverables will be deployed

according to NIF standards and will meet essential functional and performance requirements.

Additional detail on position descriptions is found in the NIF Management Descriptions document (NIF-0000810).

1.2.2 All NIF Project Personnel

Each individual in the Project organization, whether matrixed, directly employed, or subcontracted by the Project, receives Project training specified by his/her manager, and is accountable for achieving quality in his/her own work.

All personnel are responsible for executing their work and ensuring that quality-affecting activities within their purview are performed in conformance with this QAPP and the applicable approved plans and procedures, such as those cited in this QAPP (see summary in Appendix B).

1.2.3 Subtier Organizations

Subtier organizations may be described in ancillary QA plans that deal with organization specific activities. Otherwise, these organizations operate in accordance with this QAPP. Section 5.1, *Procedures and Other Instructive Documents*, states the requirement that subcontractors work according to Project approved procedures and instructions. Section 7.1, *Subcontractor Use of this QA Program*, describes other options for applying this QAPP or other quality plans to subcontractors.

1.3 Delegation of Responsibility for Quality

When responsibility for attaining quality is assigned to other Laboratory personnel, subcontract personnel, consultants, suppliers, or vendors, QA requirements and work controls shall be documented in contracts, statements of work, task records, or similar documents. These documents include, as applicable, the assigned responsibilities, lines of communication, criteria defining acceptable work, and a listing of deliverables.

The individual or organization delegating the work retains the responsibility for establishing and implementing management controls to assure that the delegated work meets quality requirements.

1.4 Cost and Schedule Control

Control of the scope and schedule of Project activities is negotiated with the DOE/NNSA by the Project Manager. The result of this negotiation is a baseline set of technical milestones and completion criteria that define success or failure. The baseline cost estimate for the Project is developed from that technical baseline. The technical,

cost, and schedule baselines are included in the Project Execution Plan, CD079. The tiered baseline change control process is defined in the Project Execution Plan, CD079.

Implementation of the baseline change control, planning, scheduling, and resource management process is established in the NIF Project Control Procedures.

1.5 Integrated Safety Management

It is the Project's policy to integrate safety into all aspects of work performed. A systematic approach to integrating safety into work planning and execution is followed. This approach is based on the seven guiding principles and five major functions contained in DOE Policy 450.4, *Safety Management System Policy.* NIF Project ISM implementation is contained in NIF ISM Policy (NIF-0018612). Each NIF Manager is responsible for identifying institutional controls or establishing his/her own specific implementing work controls (procedures) to carry out the requirements of DOE Policy 450.4 and the NIF ISM Policy (NIF-0018612). The Quality Criteria are applied and integrated with the Project's safety activities to the extent applicable.

2.0 Personnel Training and Qualification

The qualifications of Project personnel are established and documented according to guidance from each Associate Project Manager. Personnel receive Project-specific orientation and training prior to performing assigned work. Each responsible manager determines the training required and monitors that it is carried out. The responsible managers establish the training requirements and verify the training requirements of Project personnel have been satisfied using the LLNL LTRAIN system. Training updates are established to assure continued job proficiency. The update requirements are also maintained through the LLNL LTRAIN system. ES&H-related training requirements are documented in Operational Safety Procedures (OSPs) and Facility Safety Procedures (FSPs). Training requirements for construction safety is described in the *Construction Safety Program,* NIF 0001374.

Training requirements for subcontractor personnel are identified in the subcontract governing the work performed. Training is verified by examination of personnel qualification records, surveillance of work in progress, and assessment of output products through the assessment, testing, and inspection activities discussed in Sections 8.0, 9.0, and 10.0 of this QAPP.

3.0 Quality Improvement

3.1 Control of Nonconformances

All Project personnel have the responsibility to identify nonconforming items or activities (conditions adverse to quality). They are responsible for reporting these findings to appropriate management by means of a Nonconformance Report (NCR). An NCR involves four main activities:

- Identifying the requirement.
- Describing the condition found.
- Determining the disposition.
- Verifying that corrective action was taken.

The nonconforming items may be repaired, reworked, accepted as-is, or rejected. These actions are referred to as disposition of the nonconforming item. A Material Review Board (MRB) may advise the responsible technical authority on the means of disposition. The technical authority is responsible for resolution of the problem and closure of the NCR process. Significant problems require MRB review. The MRB is composed of the technical authority, specified IPT, AIT, or Expert Group members, and other technical experts determined by the technical authority/responsible manager.

Safety deficiencies are tracked via Institutional or Project-specific processes to mitigate or prevent accidents and identify opportunities for improvement.

3.2 Corrective Action

As part of the nonconformance reporting process, consideration is given to root causes and generic implications of nonconformances. Corrective action is taken according to the methods documented in the NCR, which also determines the disposition of the nonconforming item(s). When necessary, further action may be taken to prevent recurrence of nonconforming items. To maintain visibility, the responsible line manager will track these issues.

3.3 Stop Work Authority

All Project personnel have the authority and responsibility to stop his/her own work when continuation will produce or conceal results that are not in accordance with prescribed requirements. Each person has the responsibility to report such conditions to line management. Further, each person has the responsibility to stop work when there is immediate imminent danger of causing death, serious injury, or major insult to

the environment and to advise others to stop work that is creating an unsafe condition and report that unsafe condition to the appropriate safety officer.

3.4 Performance Measurement

The Project Manager, through agreements with the DOE/NNSA, establishes the Project's technical performance standards. These standards take the form of the Project's technical, cost, and schedule baselines. Performance milestones, used to measure progress, are negotiated on at least an annual basis. Status reporting, including variance reporting, is described in the Project Execution Plan, CD079.

Performance standards for individual activities are established in the drawings, specifications, procedures, plans, and test instructions that govern the work. Information on compliance with quality requirements is collected and analyzed through the nonconformance/corrective action process, management, and independent assessments. These processes provide the feedback necessary for Project personnel to address problems commensurate with their Q-Level, degree of importance, and occurrence. These data are recorded, compiled, and analyzed to assess performance trends. The results of analysis are used to identify products, services, and processes that may require improvement.

4.0 Documents and Records

4.1 Management and Technical Documents

Technical documents, such as internal reports and reviews, Project criteria, drawings, calculations, computer codes, specifications, procedures, data sheets, vendor data, Project plans, and work instructions are reviewed and released by the line organizations according to their internal policies or procedures. A standard method for processing and controlling revisions to documentation is used by the Project. The user of a document is responsible for verifying that it is current. Publications prepared for distribution outside the Project (e.g., annual and quarterly technical Project Reviews, professional journal publications) are prepared in accordance with instructions of the sponsoring organization. The LLNL Technical Information Department (TID) performs QA oversight and prepares guidance (Review and Release Process) for the release of documents to the public.

Subcontractors are required by subcontract to supply plans and procedures that describe how they will control documents and records created as a result of subcontract work.

4.2 Procurement Documents

The line managers working with the Step Managers (Engineering and Production) are responsible for implementing the work controls for technical documents that support procurements, such as supplier qualification reports, statements of work, specifications, drawings, etc. Requisitions, purchase orders, and subcontracts are controlled by the Subcontract Administrator in accordance with the procedures and policies of the LLNL Procurement & Material Department. Additional procurement controls are discussed in Section 7.0.

4.3 Quality Records

Records that provide evidence of the quality of hardware, software and/or activities (e.g., material certifications, test and inspection reports) are maintained by each responsible organization or subcontractor. Reviews and approval of technical records performed by Project personnel are accomplished according to internal procedures of the responsible organization.

Product data, such as assembly and process data, acceptance data, nonconformance reports, process control data sheets and operations data, are maintained and stored for future reference, technical analysis, and archival requirements. A central system is established to identify and provide access to the product data retained in the system.

PERFORMANCE

5.0 Work Processes

5.1 Procedures and Other Instructive Documents

Project activities are prescribed and accomplished in accordance with plans, instructions, policies, procedures, drawings, specifications, checklists, and nationally recognized codes and standards (ANSI, ASME, NFPA, etc.) appropriate to the assigned tasks. These documents contain performance standards for the work, such as quantitative and qualitative acceptance criteria for determining that the prescribed activities have been satisfactorily accomplished. The preparation, review, and approval of these documents are the responsibility of the system managers. Project activities may be governed by QA policies and in some cases, procedures. The Project's procedures are generated according to a standard content and format that are designed to present all the information needed by a user. The Laboratory's *Health & Safety Manual* provides guidance for personnel safety on the job (e.g., Lock and Tag procedure). For the construction site, the *Construction Safety Program* implements the applicable sections of the *LLNL Environment, Safety and Health Manual.* For design activities, design policies and procedures are based on the LLNL's *Engineering Manual* with NIF-specific applications incorporated in the NIF Project Control Procedures. Subcontractor activities are governed by Project-approved procedures and instructions prepared according to their QA Plans, unless otherwise noted (see Sections 1.2 and 7.1).

To the extent possible, consensus standards that already exist are applied in all work processes consistent with the requirements of the National Technology Transfer and Advancement Act, P.L. 104-113, and Office of Management and Budget Circular A-119. An example is the acceptance of the ISO 9000 quality standard utilized by certain qualified suppliers, which is consistent with the Project's graded approach.

5.2 Hardware and Software Identification and Control

Hardware items and software codes are identified and controlled according to plans, procedures, or instructions prepared by the organizations responsible for them. Identification of these items is maintained on the items or in documents traceable to them.

Processes for the identification and control of items produced by subcontractors are prescribed in subcontractor-prepared, Project-approved, procedures that describe methods for ensuring their traceability and for assuring only approved materials are used, including consumables with limited shelf lives.

5.3 Handling, Storage, and Shipping

Handling, storage, labeling, shipping, and cleaning are accomplished according to plans, specifications, procedures, or instructions prepared by the organizations responsible for the items. These procedures are designed to prevent damage, loss, or deterioration. Due to the tight cleanliness requirements for the assembly, storage, installation, and activation of the laser system, handling, storage, and shipping receives emphasis in terms of plans, specifications, and personnel training.

5.4 Control and Calibration of Measuring and Test Equipment

Control of monitoring, data collection, and test equipment is accomplished according to policies, procedures, or instructions prepared by the organization responsible for testing or according to applicable codes and standards. The instructions or standards describe methods by which gages, tools, instruments, and other equipment are to be calibrated, adjusted, and maintained at specified intervals and controlled to ensure their accuracy. Equipment of this type that does not require formal calibration is only checked for proper function as needed.

LLNL provides guidance for calibration intervals for safety-related equipment.

6.0 Design

Technical activities of the Project are controlled to a degree commensurate with their Q-Levels. Design process controls cover the range of activities from documenting design requirements and criteria through design development, interface definition output, change, records, verification, and approval.

6.1 Design Preparation and Control

The primary controls for design performed by the Project are peer reviews and design reviews. These activities are the responsibility of the Associate Project Managers working with the Engineering, Production and the Assurance organizations. The design review process is the means by which in-process and complete designs are verified for compliance with design requirements, and final designs are reviewed for readiness for procurement. Subtier organization-specific procedures or instructions may also be used to address details of individual activities.

Design is documented according to guidance of the Engineering Departments of the Institution (e.g., computations, mechanical, plant, or electronics engineering).

Subcontractors performing design and engineering services are required by subcontract to provide plans and procedures that describe their design control processes for acceptance by the Project.

6.2 Design Verification

Designs are verified by qualified personnel implementing peer review and/or the design review processes within each organization in the Project. Technical records and evidence of completed work are included in the review process. The design review process is a phased activity, and on completion, approves the design for subsequent implementation.

Safety or prestart walk-downs of facilities are conducted to verify that completed facilities and equipment are ready for operation.

6.3 Configuration Management

Configuration management, the maintenance of the relationship between physical/functional configuration and documentation, is the responsibility of the Engineering Managers. It is accomplished through management of drawings, specifications, and other design documentation of deployed hardware and software. As changes are made, the matching design records are revised accordingly. Design interfaces are identified and controlled as part of the configuration management system. The complete description of the Configuration Management process is included in the *Project Configuration Management Plan* (NIF-0015684).

7.0 Procurement

All procurement activities of the Project are accomplished according to the DOE-approved *University of California/LLNL Procurement & Materiel Department Policies and Standard Practices*. Certain procurements may be controlled by the Project to a greater degree, depending on the assigned Q-Level or other considerations.

7.1 Subcontractor Use of This QA Program

Subcontractor organizations may be described in subtier or ancillary QA plans (Section 1.2, Organization). In cases where a subtier plan will not be prepared by a subcontractor, the Project organization directing the work may permit some or all of the subcontractor's activities to be performed under the jurisdiction of this QAPP (or the Project Organization's Subtier QA Plan, if prepared). Under these circumstances, the responsible technical authority shall ensure that procurement documents specify those portions of this QAPP that apply to the subcontractor's work. In addition, Project approval of certain subcontractor work processes may be required (e.g., processes requiring augmentation due to Q-level considerations). The technical authority shall identify those processes that will require written description from the subcontractor and approval by the Project (see Section 5.1).

The QA criteria are applied to subcontractors and suppliers on a graded basis. The QA requirements may be implemented with the DOE Quality Assurance Requirement (DOE O 5700.6C), this QAPP, a consensus quality standard, or the supplier's quality plan. Augmented requirements may be included depending on the product's established Q-Level or other critical requirements. The responsible technical authority shall ensure that procurement documents specify the quality plan that applies to the subcontractor's work.

7.2 Supplier Qualification

The technical capabilities of suppliers of hardware, software, and services are evaluated by the line manager (technical authority) responsible for procurement, working with the Production- Manager. Suppliers are qualified for business fitness through the processes of the Livermore Procurement & Material Department.

7.3 Vendor Surveillance

Verification of supplier compliance to quality requirements is performed on a graded basis guided by the Q-Level of the item and service supplied. This activity includes first-article inspection, source inspection, and a review of a supplier's production and inspection records and other documentation to verify the achievement of quality at the source.

Subsequent to qualifying and early production surveillance activities, a continuing surveillance program is established to assure continued quality performance. The level and frequency of surveillance is dependent on the length and value of the procurement contract and product quality performance.

7.4 Supplier Requirements

Product and service requirements are established and provided to the supplier in accordance with LLNL and NIF Project procurement policies and procedures. The assurance that these requirements are satisfied is established through the implementation of inspection and test requirements at the supplier. The criteria for acceptance are based on the released design requirements.

8.0 Inspection and Acceptance Testing

Control and calibration of monitoring, data collection, and test equipment are accomplished as described in Section 5.4.

Qualified Project or subcontractor personnel, as directed by their line manager (technical authority), perform in-process inspections, incoming inspections, and acceptance tests. These activities are performed according to the design specifications, codes, standards, or procedures. Project personnel may witness certain inspections and tests performed by subcontractors. Project personnel periodically witness these activitiesas a part of the surveillance and assessment processes discussed in Sections 9.0 and 10.0.

Verification personnel (e.g., personnel performing QA functions), whether in the line or organizationally independent, have sufficient freedom, training, authority, access, and responsibility to do the following:

- Identify quality problems, deficiencies in hardware, processes and documentation, and noncompliance with performance objectives.
- Initiate, recommend, or provide solutions through designated channels.
- Verify implementation of the solutions.
- Assure that deficient work is stopped or is proceeding under controlled conditions until a remedy to the unsatisfactory condition is accomplished.

Implementation of inspection and test requirements is documented in inspection or test procedures and is incorporated in uniquely identified documents or directly in the drawing requirements. The depth and range of test and inspection is applied in a graded approach and is implemented at the supplier and the NIF facility during manufacture, assembly, and test operations. The criteria for acceptance is based on the released design requirements.

ASSESSMENT

9.0 Management Assessment

Project managers and supervisors participate in periodic self-assessments. Managers may independently determine the need to evaluate ongoing activities within their organizations, regardless of other activities. Management Prestart Reviews and Readiness Assessments are conducted to assure safe operation of new facilities, significant new operations/facility modifications, or facilities transitioning from the NIF Project to NIF Program ownership.

The Systems Engineering Manager, at the request of the Project Manager, critically and systematically assesses progress and proposed baseline changes that could impact achievement of the Project's mission or objectives.

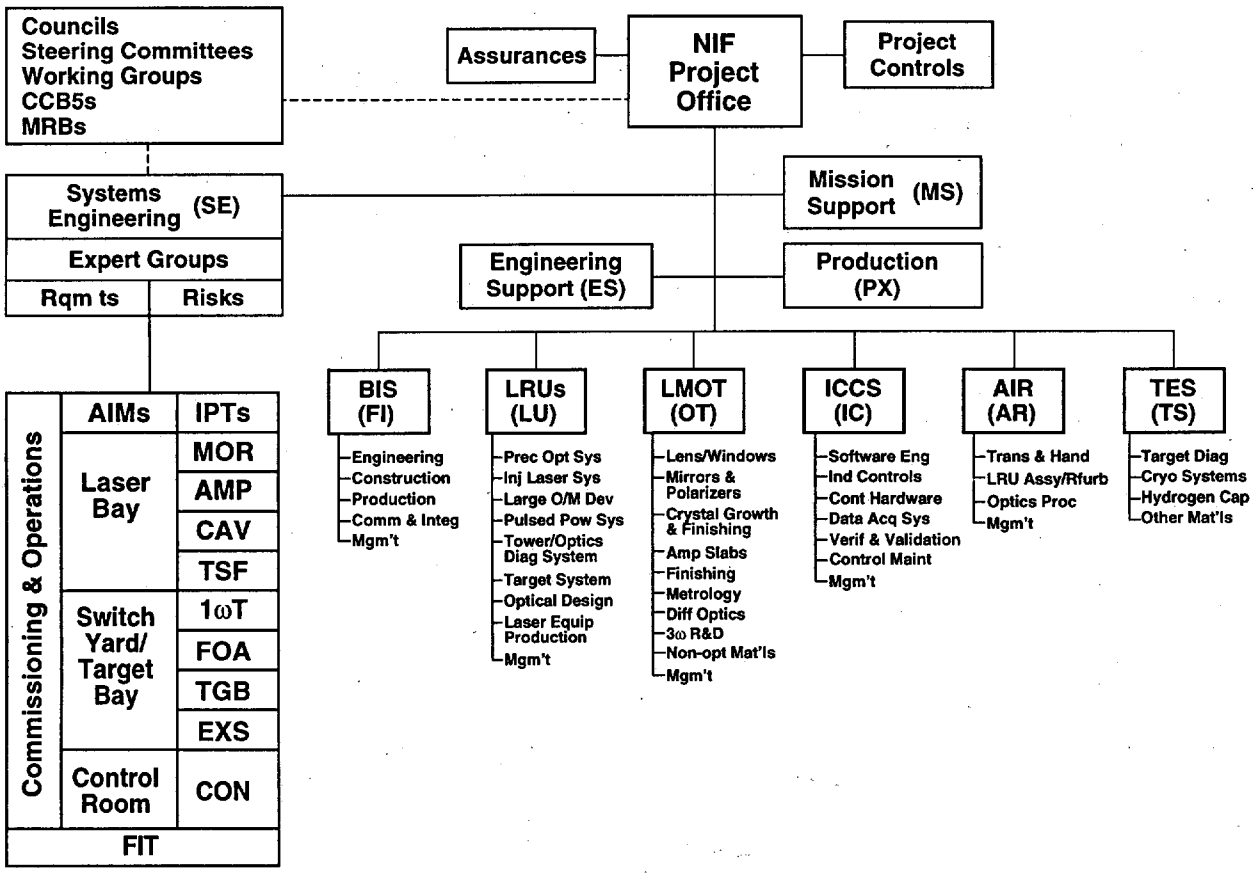
10.0 Independent Assessment

The Project QA organization schedules, plans, and conducts periodic assessments, surveillances, and audits to evaluate the line organizations' achievement of quality requirements. This system of QA oversight is designed to advise management of potential problems; it utilizes technically knowledgeable advisors working with QA evaluators to focus on performance and its results.

Assessments performed on the Project by outside organizations include:

- Quarterly Reviews performed by the NNSA Office of the NIF Project.
- Management system assessments performed by DOE Oakland.
- Validation reviews performed by the DOE HQ organization.
- Construction and fire safety reviews by DOE/NNSA.
- Independent Cost Estimate reviews performed by an independent contractor (e.g., Foster Wheeler USA).
- Technical reviews conducted by the Program Review Committee and its subcommittees under the auspices of the Laboratory Director.
- Secretary of Energy Advisory Board Task Force Reviews of the rebaseline process.
- Independent Audits conducted for the U.S. Congress by the General Accounting Office.

Appendix A: NIF Project Organization



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Note: Revision to the Appendices does not require re-approval of this plan

Appendix B: Compliance

	QA Program Criteria (from Order 5700.6 C)	Implementing Documents
1	**Program**	
	QA Program and Management	• NIF QA Program Plan (this document)
		• sub-tier QA Plans: – NIF Software QAPP (NIF-0000288) – major subcontractor QA Plans
		• Management System Description (DOE Order 430.1 compliance), NIF-0002216
		• **Policy** – Integrated Safety Management, compliance with DOE P 450.1 (section 1.5)
	Graded Approach (Q-Levels)	• **Policy** – QA Program Structure – the Graded Approach (section 1.1)
		• **Procedure** – Assignment of Q-Levels (Project Control Procedure 1.6)
	Organization	• Program Organization (Appendix A)
		• **Policy** – Senior management QA responsibilities (section 1.2)
		• **Policies** – Organizational Responsibility for Quality (sections 1.2 and 1.3)
		• Management Descriptions (NIF-0000810)
	Cost and Schedule Control	• **Policy** – Cost and Schedule Control (section 1.4)
		• **Procedure** – Cost Estimating (Project Control Manual 1.2)
		• **Procedure** – Schedule Preparation Revision (Project Control Manual 1.3)
		• **Procedure** – Baseline Change Control (Project Control Manual 1.7)
		• **Procedure** – Generation of Cost Account Plans (Project Control Manual 1.9)
		• **Procedure** – Procurement Planning, Scheduling, Review, and Approval (Project Control Manual 7.4)
2	**Personnel Training and Qualification**	
	Personnel Performing Work	• **Policy** – Training and Qualification (section 2.0)
		• **Procedure** – Hiring and Training of Personnel (Project Control Manual 2.2)
		• **Procedure** – Qualification of QA Program Auditors (Project Control Procedure 2.3)
		• Operational Safety Procedures and Facility Safety Procedures (LLNL H&S Manual Supplement 2.02)
	Personnel Verifying Work	• **Policy** – Training and Qualification (section 2.0)
3	**Quality Improvement**	

	QA Program Criteria (from Order 5700.6 C)	Implementing Documents
	Nonconformance Control	• **Policy** – Control of Nonconformances (section 3.1)
		• **Procedure** – Nonconformance Reporting (Project Control Procedure 3.2)
	Corrective Action Tracking	• **Policy** – Corrective Action (section 3.2)
	Stop Work Authority	• **Policy** – Stop Work Action (section 3.3)
		• **Procedure** – Stop Work Action (Project Control Manual 3.3)
	Performance Measurement	• **Policy** – Performance Measurement (section 3.4)
4	**Documents & Records**	
	Technical Documents	• **Policy** – Management and Technical Documents (section 4.1)
		• Review and Release Process, Technical Information Dept.(TID)
		• **Procedure** – Document and Records Control (Project Control Manual 4.1)
	Quality Records	• **Policy** – Quality Records (section 4.3)
	Procurement Documents	• **Policy** – Procurement Documents (section 4.2)
		• Procedures and policies of the LLNL Procurement & Materiel Department
5	**Work Processes**	
	Instructions, Procedures, Drawings	• **Policy** – Procedures and Other Instructive Documents (section 5.1)
		• Institutional procedures for job safety (LLNL ES&H Manual, UCRL-MA-133867)
		• Engineering Policies and Procedures Manual, (http://www-engr.llnl.gov/primetime_website/1_bookshelf/P3Manual/Pol_Proc_Pract_Man.html)
		• ME Department Policies and Procedures (UCRL-MA-123471)
		• **Procedure** – Design Review (Project Control Manual 5.1)
		• **Procedure** – Preparation and Revision of SARs (Project Control Manual 5.2, 5.3)
	Identification & Control of Items	• **Policy** – Identification and Control of Hardware and Software (section 5.2)
	Handling, Storage & Shipping	• **Policy** – Handling Storage and Shipping (section 5.3)
	Control of Measuring and Test Equipment	• **Policy** – Control and Calibration of Test and measurement Equipment (section 5.4)
		• Implementation Plan for Laboratory Site Operations Calibration Program (http://www-r.llnl.gov/Iso/eshqa/calib/01calibration.html)
6	**Design**	
	Design Preparation and Control	• **Policy** – Design Preparation and Control (section 6.1)
		• ME Design Safety Standards (M-012)

	QA Program Criteria (from Order 5700.6 C)	Implementing Documents
		• **Procedure** – Preparation and Revision of Design Requirements (Project Control Manual 6.1, 6.2)
		• **Procedure** – Engineering Drawing Standards and Control (Project Control Manual 6.3)
		• **Procedure** – Engineering Change Requests (Project Control Manual 6.4)
	Design Verification	• **Policy** - Design verification (section 6.2)
	Configuration Management	• **Policy** – Configuration Management (section 6.3)
		• Configuration Management Plan
7	**Procurement**	
	Standard Procurement Practice	• DOE-approved *University of California/LLNL Procurement & Materiel Department Policies and Standard Practices,* including Laboratory Commercial Procurement Procedures
		• **Procedure** – Procurement Planning, Scheduling, Review, and Approval (Project Control Manual 7.4)
		• **Procedure** – Subcontract Administration (Project Control Manual 7.5)
	Supplier Qualification	• **Policy** – Supplier Qualification (section 7.2)
		• **Procedure** – Supplier Qualification (Project Control Manual 7.1)
	Vendor Surveillance	• **Policy** – Vendor Surveillance (section 7.3)
		• **Procedure** – Vendor Surveillance (Project Control Manual 7.3)
8	**Inspection and Acceptance Testing**	
	Inspection	• **Policy** – Inspection (section 8.1)
		• **Procedure** – Suspect/Counterfeit Items Detection and Prevention (Project Control Manual 8.1)
		• **Procedure** – Standard Content for Specifications (Project Control Manual 8.2)
		• **Procedure** – Incoming Inspection (Project Control Manual 8.5)
	Acceptance Testing	• **Policy** – Acceptance Testing (section 8.2)
		• **Procedure** – Preparation and Standard Content for Commissioning Test Procedures (Project Control Manual 8.3)
9	**Management Assessment**	
	Technical Objectives	• **Policy** – Management Assessment (section 9.0)
		• **Procedure** – Management Pre-Start Review Project Control Manual 9.3)

	QA Program Criteria (from Order 5700.6 C)	Implementing Documents
		• **Procedure** – Management Self-Assessment Project Control Manual 9.2)
		• Risk Management Plan
10	**Independent Assessment**	
	QA Oversight and Audits	• **Policy** – Independent Assessments (section 10.0)
		• **Procedure** – Independent Assessment (Project Control Manual 10.1)
		• **Procedure** – QA Surveillance (Project Control Manual 10.2)
	Auditor Qualification	• **Policy** – Personnel Qualification and training (section 2.0)

Appendix C: ISM Implementation by NIF Project

Policy 450.4 Component	LLNL ISMS Description Section/Title	NIF Project Document	Applicable Section or Explanation
ISMS Guiding Principles	Guiding Principle 1: Line Management Responsibility for Safety	Project Execution Plan (UCRL-ID-126525, Rev. 1)	Sections 3.0 and 5.1
		Quality Assurance Program Plan (NIF-0000618)	Sections 1.1 and 1.3
		Project Management System Description (NIF-0000810)	Entire document
		Title III Engineering Plan (NIF-0010448)	Section 3
		Cost Account Plans	Safety oversight is budgeted; see description in Project Procedure 1.9, Generation of Cost Account Plans, Attachment C
		Project Data Sheet	ES&H responsibilities defined
		Construction Safety Program (NIF-0001321)	Section 1
		Mitigation Action Plan (NIF-0001726)	Section 1
		Final Safety Analysis Report (in preparation)	Chapters 1 and 5
	Guiding Principle 2: Clear Roles and Responsibilities	Mitigation Action Plan (NIF-0001726)	Section 1.2 and Tables 2.1 through 2.8
		Title III Engineering Plan (NIF-0010448)	Section 4
		ES&H Management Plan (NIF-LLNL-95-599, L-20423-1)	Section 2
		Project Control Manual	Section 3 of each procedure
		Project Data Sheet (Appendix G of Project Execution Plan)	ES&H activities included as budgetary line-items
		Site Management Plan (NIF-0002564)	Section 2
		Construction Safety Program (NIF-0001321)	Section II and Appendix A, Section 1
		Project Execution Plan (UCRL-ID-126525, Rev. 1)	Section 3.0
		Project Management System Description (NIF-0000810)	Entire document

Guiding Principle 3: Competence Commensurate with Responsibilities	Operations Training Plan (NIF-00011938)	Sections 2 and 3
	OSPs (to be prepared)	Defines safety training
	L-Train	Tracks all required training
	Construction Safety Program (NIF-00001321)	Section III and Appendix A
Guiding Principle 4: Balanced Priorities	Control Account Plans (CAPs)	See description in Project Procedure 1.9, Generation of Cost Account Plans, Attachment C
	Record of Decision (NIF-0001345)	Section 1.B.2 Section 1.B.4
	Baseline Cost Estimate	ES&H activities included in estimate
	Project Data Sheet	ES&H activities included in roll-up
	Mitigation Action Plan (NIF-0001726)	Section 2
	Decommissioning Plan (NIF-0001670)	Sections 1.3 and 5
	ES&H Management Plan (NIF-LLNL-95-599, L-20423-1)	Section 2.1
	Pollution Prevention and Waste Minimization Plan (NIF-0010575)	Section 4
Guiding Principle 5: Identification of Safety Standards and Requirements	System Design Requirements (SDRs)	For an example see SDR001 (NIF-000192-OC): Section 2.2.2, Other Government Regulations; Section 2.4, Applicable LLNL Standards; and Section 3.3, Design and Construction
	Functional Requirements/Primary Criteria (NIF-0001016-OC)	Section 3.0 Safety Requirements
	Subsystem Design Requirements (SSDRs)	For an example see SSDR 1.2.2.1, Section 3.2
	Process for the Development of the NIF Primary Criteria and Functional Requirements (NIF-0001566)	Entire document
	Preliminary Hazards Analysis (NIF-LLNL-93-125)	Section 3
	Fire Hazards Analysis (NIF-0003108)	Section 3
	Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 1

		Final Safety Analysis Report (in preparation)	Chapter 1
		Construction Safety Program (NIF-00001321)	Section II, Appendix A
		Mitigation Action Plan (NIF-0001726)	Section 1.2
		Decommissioning Plan (NIF-0001670)	Section 1.1
		Fire Hazards Analysis, Title I (NIF-0003108)	Section 3.1
	Guiding Principle 6: Hazards Control Tailored to the Work being Performed	ES&H Management Plan (NIF-LLNL-95-599, L-20523-1)	Section 2
		Facility Safety Plan (to be prepared)	All
		Quality Assurance Program Plan (NIF-000618-OB)	Sections 1.1 and 1.3
		Preliminary Hazards Analysis (NIF-LLNL-93-125)	Section 3
		Fire Hazards Analysis, Title I (NIF-0003108)	Section 3
		Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 4
		Final Safety Analysis Report (in preparation)	Chapter 4
		Construction Safety Program (NIF-00001321)	Appendix A
		Decommissioning Plan (NIF-0001670)	Sections 3 and 4
		Pollution Prevention and Waste Minimization Plan (NIF-0010575)	Section 5
		Risk Management Plan (NIF-0001564-OB)	Section 5
		Operational Safety Plans (to be prepared)	All
		Project Control Procedure 5.9Job Hazards Analyses	All
	Guiding Principle 7: Operations Authorization	Project Procedure 3.3, Stop Work	Entire document
		Work Authorization (in preparation)	Entire document
		Integration Worksheet (in preparation)	Entire document
		Construction Safety Program (NIF-00001321)	Section II IIIB
		Record of Decision (NIF-0001345)	Section 1.B.4
		Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 5
		Final Safety Analysis Report (in preparation)	Chapter 5
		Mitigation Action Plan (NIF-0001726)	Section 1.3

ISMS Core Functions	Core Function 1: Define the Scope of Work	Title III Engineering Plan (NIF-0010448)	Sections 1.0
		Functional Requirements/Primary Criteria (NIF-0001016-OC)	All sections
		Subsystem Design Requirements	All sections
		Title II Design Packages	All sections
		Procurement (specifications, certifications, etc.)	All sections
		Construction Safety Program (NIF-00001321)	Section IIIB
		Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 3
		Final Safety Analysis Report (in preparation)	Chapter 3
		Risk Management Plan (NIF-0001564-OB)	Section 3
		Fire Hazards Analysis, Title I (NIF-0003108)	Sections 3, 5, 6, and 8
		Pollution Prevention and Waste Minimization Plan (NIF-0010575)	Section 4
		Decommissioning Plan	Section 1.3
		Final PEIS for Stockpile Stewardship and Management	Appendix I, Chapter I.3 (Project Specific Analysis)
	Core Function 2: Analyze Hazards	Record of Decision (NIF-0001345)	Sections 1.B.2.2 and 1.B.3
		Preliminary Hazards Analysis (NIF-LLNL-93-125)	Section 3 and 4
		Final Safety Analysis Report (in preparation)	Chapter 4
		Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 4
		Risk Management Plan (NIF-0001564-OB)	Sections 4 and 5
		Decommissioning Plan (NIF-0001670)	Sections 3 and 4
		Radiological Analysis of the NIF (YCRL-RL-115188)	Sections I through III
		Fire Hazards Analysis, Title I, (NIF-0003108)	Section 5.9
		Operational Safety Plans (to be prepared)	All sections
		Project Control Procedure 5.9, Job Hazards Analyses	All sections
		Construction Safety Program (NIF-0001321)	Section III
		Facility Safety Plan	All sections

Core Function 3: Develop and Implement Controls	ES&H Management Plan (NIF-LLNL-95-599, L-20423-1)	Section 2
	PEIS for Stockpile Stewardship and Management	Volume 3, I.4 and I.5
	Operating Procedures (to be prepared)	All sections
	Project Control Procedure 5.9, Job Hazards Analyses (to be prepared)	All sections
	Mitigation Action Plan (NIF-0001726)	Section 2
	Project Control Manual	Project Procedures 1.6, 3.2, and 5.2
	Preliminary Hazards Analysis (NIF-LLNL-93-125)	Section 4
	Preliminary Safety Analysis Report (NIF-LLNL-96-238)	Chapter 4
	Final Safety Analysis Report (in preparation)	Chapter 4
	Fire Hazards Analysis, Title I (NIF-0003108)	Sections 3, 5, 6, and 8
	Risk Management Plan (NIF-0001564-OB)	Section 5
	Cost Account Plans	ES&H tasks identified
	Title III Engineering Plan (NIF-10448-OA)	Appendix B
	Pollution Prevention and Waste Minimization Plan (NIF-0010575)	Section 5 and Appendix A
	Start-up/Operations Engineering and Special Equipment Construction Safety and Health Plan (NIF-002437-OC)	Appendix C
	Construction Safety Program (NIF-00001321)	Section III, Appendix A
	Operational Safety Plans (in preparation)	All sections
Core Function 4: Perform Work	Safety Audits	98-03 through 07, Material Handling Review (NIF-0012302) 97-05 and 07
	Cost Account Plans	ES&H tasks identified
	Operating and Maintenance Procedures (to be prepared)	All sections

	Core Function 5: Feedback and Improvement	Project Procedure 3.2, Nonconformance Reporting	Section 4.2 and 4.3
		Mitigation Action Plan (NIF-0001726)	Section 1.3 and 2
		Project Procedure 9.2, Management Assessments	Entire document
		Project Procedure 10.1, Independent Assessment	Entire document
		Pollution Prevention and Waste Minimization Plan (NIF-0010575)	Appendix A
		Incident Analysis Reports	Entire document
		Lessons Learned Reports	Entire Document